



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,611	10/06/2003	Tapesh Yadav	037768-0137	3294
24959	7590	08/27/2010	EXAMINER	
PPG INDUSTRIES INC INTELLECTUAL PROPERTY DEPT ONE PPG PLACE PITTSBURGH, PA 15272				LORENGO, JERRY A
ART UNIT		PAPER NUMBER		
1793				
MAIL DATE		DELIVERY MODE		
08/27/2010		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

---

*Ex parte* TAPESH YADAV and CLAYTON KOSTELECKY

---

Appeal 2009-007053  
Application 10/679,611  
Technology Center 1700

---

Before EDWARD C. KIMLIN, CHUNG K. PAK, and  
CATHERINE Q. TIMM, *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's decision finally rejecting claims 17 through 41, all of the claims pending in the above-identified application.<sup>2</sup> We have jurisdiction under 35 U.S.C. §§ 6 and 134.

---

<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

<sup>2</sup> See page 4 of the Revised Appeal Brief ("App. Br.") filed May 28, 2008.

## STATEMENT OF THE CASE

The subject matter on appeal is directed to a screen printable formulation comprising nanofillers having particular domain sizes and/or aspect ratios. (See, e.g., claims 17, 24, 32, and 33.) The Specification defines the screen printable formulation as including printing inks and pastes. (See, e.g., the Abstract of the Disclosure.) The Specification also states that the nanofiller used in the formulation “can be inorganic, organic, or metallic, and may be in the form of powders, whiskers, fibers, plates or films” (Spec. 8, para. 0029). According to paragraphs 0007 and 0037 of the Specification:

“Domain size” as that term is used herein, refers to the minimum dimension of a particular material morphology. In the case of powders, the domain size is the grain size. In the case of whiskers and fibers, the domain size is the diameter. In the case of plates and films, the domain size is the thickness.

The term “aspect ratio” refers to the ratio of the maximum to the minimum dimension of a particle. The term “whisker” refers to any elongated particle (e.g., a particle having an aspect ratio greater than one, and preferably at least two).

Details of the appealed subject matter are recited in representative claims 17, 24, 32, and 33<sup>3</sup> reproduced from the Claims Appendix to the Revised Appeal Brief as shown below:

---

<sup>3</sup> Appellants do not argue any of the claims on appeal separately, but instead focus their arguments on the limitations of claims 17, 24, 32, and 33 (e.g., App. Br. 9-14). Therefore, for purposes of this appeal, we select claims 17, 24, 32, and 33 to decide the propriety of the Examiner’s §§ 102(b) and 103(a) rejections set forth in the Answer. *See* 37 C.F.R. § 41.37(c)(1)(vii) (“When multiple claims subject to the same ground of rejection are argued

17. A screen printable formulation comprising metallic fillers with domain size less than 100 nanometers and an aspect ratio greater than one.

24. A screen printable formulation comprising ceramic nanofillers with domain size less than 100 nanometers and an aspect ratio greater than one.

32. A screen printable formulation comprising nanofillers with domain size less than 250 nanometers and the nanofillers comprise copper.

33. A screen printable formulation comprising nanofillers with domain size less than 100 nanometers and the nanofillers comprise copper.

As evidence of unpatentability of the claimed subject matter, the Examiner relies on the following prior art references at page 2 of the Answer:

Craig	4,292,029	Sep. 29, 1981
Alexander	4,944,985	Jul. 31, 1990
Nakayama	5,718,047	Feb. 17, 1998

Appellants seek review of the following grounds of rejection at page 8 of the Appeal Brief:

- 1) Claims 32, 33, 38, and 40 under 35 U.S.C. § 102(b) as anticipated by the disclosure of Alexander;
- 2) Claims 39 and 41 under 35 U.S.C. § 103(a) as unpatentable over the disclosure of Alexander; and
- 3) Claims 17 through 31 and 34 through 37 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Alexander and either Craig or Nakayama.

---

as a group by appellant, the Board may select a single claim from the group of claims that are argued together to decide the appeal with respect to the group of claims as to the ground of rejection on the basis of the selected claim alone.”).

## ISSUES AND CONCLUSIONS

With respect to the first two grounds of rejection, the dispositive question raised by Appellants and the Examiner is: Has the Examiner erred in finding that Alexander describes a screen printable formulation having a nanofiller comprising copper with a domain size of less than 100 or less than 250 nanometers with sufficient specificity to constitute a description within the purview of 35 U.S.C. § 102(b)? On this record, we answer this question in the affirmative.

With respect to the third ground of rejection, the dispositive question raised by Appellants and the Examiner is: Has the Examiner erred in finding that the collective teachings of Alexander and either Craig or Nakayama would have suggested a screen printable formulation, i.e., an ink, comprising metallic or ceramic fillers having a domain size of less than 100 nanometers and an aspect ratio of greater than one within the purview of 35 U.S.C. § 103(a)? On this record, we answer this question in the negative.

## RELEVANT FACTUAL FINDINGS

The following relevant factual findings are supported by at least a preponderance of the evidence. *Ethicon, Inc. v. Quigg*, 849 F.2d 1422, 1427 (Fed. Cir. 1988)(explaining the general evidentiary standard for proceedings before the Office):

1. Alexander teaches ultra-fine particles having plating thereon, metal powder of ultra-fine colloidal sized particles with cores or centers with a dense and continuous plating of at least one metal, or metal articles having a plurality of ultra-fine particles dispersed therein (col. 1, ll. 8-17).
2. Alexander teaches that the ultra-fine particles or dispersoids are selected from silica, carbon, alumina, copper, nickel, iron, cobalt,

molybdenum, tungsten and alloys of these metals, or these with other water insoluble metal silicates, metal oxides, complex oxides or other inert or non-inert materials and have a diameter in the range of 5 to 500 nm when they are substantially spherical in shape or colloidal (col. 6, ll. 21-40).

3. Alexander also teaches that ultra-fine particles or dispersoids may be either crystalline or amorphous metals or ceramics, can be in the form of a sphere, elongated particles or plate like particles depending on their usage and preferably have a size in the range of 5 to 500 nanometers (col. 9, ll. 7-17).

4. Alexander describes employing ultra-fine particles or dispersoids, such as copper or silica, coated or plated with a corrosion resistant metal, such as gold, in the manufacture of conductive paints, pastes or inks (col. 13, ll. 41-52).

5. Alexander also teaches (col. 15, l. 64 to col. 16, l. 8) that:

Metallic inks involving noble metals are, today, commonly used. These inks require discrete, constant sized and substantially spherical particles in order to achieve good performance. Silver composites containing silica can be prepared in which there is little or no aggregation in the structure. These materials are useful as metallic inks. Silica particles can be obtained in a variety of sizes. "Ludox" from E.I. duPont de Nemours and Company can be purchased in sizes of 7, 12 or 22 nanometers. Colloidal silica can be grown to larger sizes in aqueous solutions by heating under pressure as has already been mentioned (see Iler's book).

6. Alexander teaches that the sizes of the ultra-fine particles or dispersoids vary depending on their usages and the composition of ultra-fine particles or dispersoid being coated or plated (col. 8, ll. 16-41 and col. 13 to col.15),

7. Appellants do not argue that the ultra-fine particles or dispersoids taught by Alexander are not fillers (App. Br. 9-10).
8. Appellants do not dispute the Examiner's finding that "it is 'known in the printing arts that inks, for example, are suitable in the formation of printed matter'" (*Compare* Ans. 7 with App. Br. 11.)
9. Craig teaches that inorganic fillers having a particle size ranging from 5 to 500 nanometers and in the form of spheres, platelets, fibers, whiskers, or particles of any regular or irregular shape in the context of dental restorative coating compositions are known (col. 5 to col. 6, ll. 33-52).
10. Nakayama teaches a conductive paste used for screen printings, which employs conductive fillers selected from copper, nickel, gold, silver or alloy thereof in the form of fiber, whisker, or flake (col. 5, ll. 41-67).

#### ANALYSIS AND PRINCIPLES OF LAW

##### I. CLAIMS 32, 33, 38, AND 40 UNDER 35 U.S.C. § 102(b)

Under 35 U.S.C. § 102(b), anticipation is established only if "each and every element as set forth in the claim is found, either expressly or inherently, described in a single prior art reference." *Verdegall Bros., Inc. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). The single prior art reference needs to describe each and every element as set forth in the claim "with sufficient specificity to constitute a description thereof within the purview of 35 U.S.C. § 102". *In re Schaumann*, 572 F.2d 312, 315 (CCPA 1978).

Here, Alexander describes employing ultra-fine particles or dispersoids, such as copper or silica, coated or plated with a corrosion resistant metal, such as gold, in the manufacture of conductive paints, pastes or inks. Alexander teaches that these ultra-fine particles or dispersoids have

a preferred size in the range of 5 to 500 nanometers. Alexander also teaches that the sizes of ultra-fine particles or dispersoids may vary depending on their usages and do not specify any particular sizes of the ultra-fine particles or dispersoids made of copper used in conductive paints, pastes or inks. In other words, Alexander discloses ultra-fine particles or dispersoids corresponding to the claimed fillers used in a printable formulation, which are made of copper in a size of 5 to 500 nanometers, partially overlapping with the claimed filler particle size range of less than 100 or 250 nanometers. As our reviewing court stated in *Atofina v. Great Lakes Chemical Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006):

*Titanium Metals [v. Banner*, 778 F.2d 775, 783 (Fed. Cir. 1985)] stands for the proposition that an earlier species reference anticipates a later genus claim, not that an earlier genus anticipates a narrower species. Here, the prior art, ..., discloses a temperature range of 100 to 500 °C which is broader than and fully encompasses the specific temperature range claimed ... of 330 to 450 °C. Given the considerable difference between the claimed range and the range in the prior art, no reasonable fact finder could conclude that the prior art describes the claimed range with sufficient specificity to anticipate this limitation of the claim.”

Thus, we concur with Appellants the Examiner has not shown that Alexander describes the claimed invention with sufficient specificity to satisfy the requirements of 35 U.S.C. § 102(b).

In response to Appellants’ arguments at pages 9 and 10 of the Appeal Brief, the Examiner states at page 6 of the Answer that the disclosure of overlapping particle sizes in Alexander would have rendered the claimed subject matter *prima facie* obvious. Indeed, our reviewing court stated in *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003):

In cases involving overlapping ranges, we and our predecessor court have consistently held that even a slight overlap in range establishes a *prima facie* case of obviousness . . . . We have also held that a *prima facie* case of obviousness exists when the claimed range and the prior art range do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 783 (Fed. Cir. 1985).

However, the Examiner's rejection of claims 32, 33, 38, and 40 is based on anticipation under 35 U.S.C. § 102(b), not based on obviousness under 35 U.S.C. § 103(a).

Accordingly, we reverse the Examiner's § 102(b) rejection of claims 32, 33, 38, and 40 and enter a new ground of rejection against claims 32, 33, 38, and 40 under 35 U.S.C. § 103(a) as unpatentable over the disclosure of Alexander for the reasons stated *supra* pursuant to 37 C.F.R. § 41.50(b).

II. CLAIMS 39 AND 41 UNDER 35 U.S.C. § 103(a)

The Examiner's obviousness rejection of claims 39 and 41 is premised upon correctness of the anticipation analysis set forth in the Examiner's § 102(b) rejection.

Thus, for the same reasons set forth above, we reverse the Examiner's § 103(a) rejection of claims 39 and 41. However, we enter a new ground of rejection against claims 39 and 41 under 35 U.S.C. § 103(a) based on the new rationale set forth above, in addition to the findings of fact at page 4 of the Answer pursuant to 37 C.F.R. § 41.50(b).

III. CLAIMS 17-31 AND 34-37 UNDER 35 U.S.C. § 103(a)

As stated by Supreme Court of the United States in *KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007):

[A]nalysis [of whether the subject matter of a claim would have been obvious under § 103] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.

Here, Alexander teaches that ultra-fine particles or dispersoids corresponding to the claimed filler may be either crystalline or amorphous metals or ceramics, can be in the form of sphere, elongated particles or plate like particles depending on their usages and preferably have a size in the range of 5 to 500 nanometers. Alexander also teaches employing ultra-fine particles or dispersoids, such as copper or silica, coated or plated with a corrosion resistant metal, such as gold, in the manufacture of *conductive* paints, *pastes* or inks. Alexander further states (col. 15, l. 64 to col. 16, l. 8) that:

Metallic inks involving noble metals are, today, commonly used. These inks require discrete, constant sized and substantially spherical particles in order to achieve good performance. Silver composites containing silica can be prepared in which there is little or no aggregation in the structure. These materials are useful as metallic inks.

Although Alexander does not specify the claimed aspect ratio of greater than one, Alexander, by virtue of suggesting the employment of “substantially” spherical dispersoid or ultra-fine particles, would have suggested employing ultra-fine or dispersoid particles having an aspect ratio of greater than one since according to appellants, the term “aspect ratio” refers to the ratio of the

maximum to the minimum dimension of a particle. In other words, those particles having imperfect spherical shapes (substantially spherical) have an aspect ratio of greater than one since imperfect spherical particles, unlike those perfect spherical particles having the identical maximum and minimum diameters, necessarily have their maximum diameters at least little greater than their minimum diameters.

In any event, Nakayama, like Alexander, teaches a *conductive paste* used for screen printings employing conductive fillers selected from copper, nickel, gold, silver or alloy thereof. Nakayama teaches that this filler can be in the form of fiber, whisker, or flake, which necessarily has an aspect ratio of greater than one. This disclosure of Nakayama is also consistent with Alexander, which describes employing ultra-fine particles or dispersoids in the form of sphere, elongated particles or plate like particles depending on their usages. Craig further teaches that the fillers taught and/or suggested by Nakayama and Alexander are known fillers.

Given the above teachings, we concur with the Examiner that one of ordinary skill in the art would have been led to employ ultra-fine or dispersoid particles (corresponding to the claimed filler) in the form of either spherical or elongated particles, such as fibers or whiskers (necessarily having an aspect ratio of greater than one), having, *inter alia*, the claimed nano-particle sizes, in a screen printable formulation, such as a conductive paste within the meaning of 35 U.S.C. § 103.

Contrary to Appellants' arguments at pages 11 and 14 of the Appeal Brief, Alexander's reference to commonly used inks does not teach one of ordinary skill in the art away from employing non-spherical shape particles, i.e., particles having aspect ratios of greater than one, in conductive pastes

used in screen printable formulations. Nowhere does Alexander discourage one of ordinary skill in the art from employing non-spherical particles, i.e., particles having the claimed aspect ratios, in a screen printable formulation, such as conductive pastes and/or inks. Alexander does not indicate that non-spherical ultra-fine or dispersoid particles are not useful for conductive pastes or inks. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994)( “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.”).

Accordingly, for the reasons set forth in the Answer and above, we affirm the Examiner’s decision rejecting claims 17 through 31 and 34 through 37 under § 103(a) based on the combined teachings of Alexander and either Nakayama or Craig.

#### ORDER

In view of the foregoing, we affirm the Examiner decision rejecting claims 17 through 31 and 34 through 37 under 35 U.S.C. § 103(a), reverse the Examiner’s decision rejecting claims 32, 33, 38, and 40 under 35 U.S.C. § 102(b) and claims 39 and 41 under 35 U.S.C. § 103(a), and enter a new ground of rejection against claims 32, 33, and 38 through 41 under 35 U.S.C. § 103(a) as unpatentable over Alexander pursuant to 37 C.F.R. § 41.50(b).

37 C.F.R. § 41.50(b) provides that the appellant, *WITHIN TWO MONTHS FROM THE DATE OF THE DECISION*, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

(1) *Reopen prosecution.* Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .

(2) *Request rehearing.* Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

Should Appellant elect to prosecute further before the Examiner pursuant to 37 C.F.R. § 41.50(b)(1), in order to preserve the right to seek review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection, the effective date of the affirmance is deferred until conclusion of the prosecution before the Examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If Appellant elects prosecution before the Examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for rehearing thereof.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a) (2008).

**AFFIRMED-IN-PART/§ 41.50(b)**

tc  
PPG INDUSTRIES INC  
INTELLECTUAL PROPERTY DEPT  
ONE PPG PLACE  
PITTSBURGH, PA 15272